

Correspondence

Reply to “Comments on ‘Assessment of the low-temperature EnviNOx[®] variant for catalytic N₂O abatement over steam-activated FeZSM-5: Miguel A.G. Hevia, Javier Pérez-Ramírez, Appl. Catal. B: Environ. 77 (2008) 248–254”

In their Letter to the Editor, Groves and Schwefer from Uhde comment on our previous work [1], where we studied the low-temperature variant of the Uhde's EnviNOx[®] process for tail-gas N₂O abatement. For the said purpose, we applied an iron-containing ZSM-5 catalyst prepared by hydrothermal synthesis and steam activation [2]. Along the paper, we made use of the term EnviNOx[®] to generally designate the process in which N₂O and NO_x are catalytically abated over iron zeolites according to the variants a, b, and c illustrated in Fig. 1. These can be found in brochures published at <http://www.uhde.biz>.

The main argument by Groves and Schwefer is that our conclusions over the steam-activated FeZSM-5 cannot be transferred to the real EnviCat[®] catalyst, although they both are iron zeolite materials. In this sense, our paper is ethically impeccable, since direct disclaimers were made calling for precaution when extrapolating results over our steam-activated FeZSM-5 to the particular catalyst(s) commercialized by Uhde/Süd Chemie. It is not our intention to discredit the EnviNOx[®] process, which has been successfully implemented in several plants. However, focusing on the low-temperature variants (Fig. 1b and c), our results demonstrate that both NO_x and NH₃ have a negative effect on the selective catalytic reduction of N₂O with CH₄ over steam-activated FeZSM-5, shifting the temperature for high degree of N₂O conversion over 700 K, and ultimately approaching typical operating temperatures of the high-temperature variant (Fig. 1a). Accordingly, the main message we convey is that the low-temperature variant requires precise dynamic ammonia dosing in order to guarantee zero NH₃ and NO_x concentration at the inlet of the de-N₂O bed. Otherwise, the reducing action of the hydrocarbon is not effectively utilized for low-temperature N₂O destruction.

We strongly oppose on unjustified comments stating that our paper “lacks of objectivity and scientific rigour” and its conclusions “are devoid of any foundation”. These contrast with the positive comments by expert peers in the reviewing process and many other colleagues with whom the outcome of the work has been discussed. Some of us have been active in catalytic N₂O control since 1998 and reached scientific recognition at international level for contributing to the topic. We believe that Groves and Schwefer are aware of this. In fact, after all, they asserted that our experiments “seem carefully executed and produce scientifically interesting data”.

One can notice the commercial character of the letter by Groves and Schwefer in terms of potential industrial users of the technology, differing from our purely scientific finality. Instead of rebating our conclusions with substantial experimental results and/or references, Groves and Schwefer center the letter in advertising the EnviNOx[®] process vis-à-vis secondary tail-gas abatement technologies, being not the subject of [1]. Any comment from us on that refers to [3], reviewing process options for N₂O control in nitric acid plants.

In conclusion, besides reaffirming our catalytic results over steam-activated FeZSM-5, we should add that a similar outcome (NO_x and NH₃ effects on the CH₄-SCR of N₂O) was derived from recent tests in our group with FeZSM-5 prepared by liquid-ion exchange. Again, we underline that this is not the real Uhde/Süd Chemie catalyst and does not enable generalization. Therefore, we encourage Groves and Schwefer to report deeper experimental evidence over the real EnviCat[®] catalyst. Since the low-temperature EnviNOx[®] variant is protected by patents, which are hopefully published, more open information could be disclosed. If so, it would be of scientific value understanding the features of EnviCat[®] that make it distinct for N₂O reduction with CH₄ in the presence of NH₃ and NO_x compared to the systems tested by us and other authors. We offer ourselves to conduct some of these investigations.

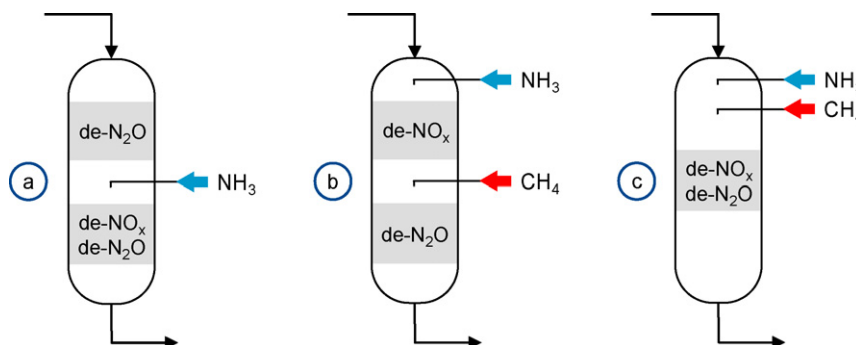


Fig. 1. Variants of the EnviNOx[®] process for N₂O-NO_x abatement. More details in [1].

References

- [1] M.A.G. Hevia, J. Pérez-Ramírez, *Appl. Catal. B* 77 (2008) 248.
- [2] J. Pérez-Ramírez, G. Mul, F. Kapteijn, J.A. Moulijn, A.R. Overweg, A. Doménech, A. Ribera, I.W.C.E. Arends, *J. Catal.* 207 (2002) 213.
- [3] J. Pérez-Ramírez, F. Kapteijn, K. Schöffel, J.A. Moulijn, *Appl. Catal. B* 44 (2003) 117.

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